Advances in Li-ion Cell Development

Subbarao Surampudi, Chen-Kuo Huang, Marshall Smart, David Perrone, Sal DiStefano, and Gerald Halpert

Jet Propulsion Laboratory,
California Institute of Technology
4800 Oak Grove Drive,
Pasadena, CA 91109

ABSTRACT

JPL is presently engaged in the development of Li-ion cells for future space applications. Future space missions require batteries that can provide high specific energy (> 100 Wh/Kg), long cycle life (> 1000 cycles) and good low temperature (- 40 °C) performance capability. Some of the projected space applications are New Millennium spacecraft, rovers and penetrators, etc. Work is in progress in various areas, such as: advanced electrode materials and electrolytes, cell design optimization, and destructive physical analysis (DPA). The advanced material research is focused on the assessment of alternate anode materials and electrolytes for low temperature applications. The influence of various cell design parameters were investigated by robust design approach (Taguchi method). Newly assembled and cycled cells were analyzed to establish failure modes and mechanisms. This paper summarizes the progress which has been recently accomplished at JPL.